

Appln. No. 09/836,885
Amendment dated April 30, 2003
Reply to Office Action of February 6, 2003

REMARKS/ARGUMENTS

Reconsideration of the above-identified application respectfully requested.

Finality of Rejection:

The Examiner acknowledges having considered Applicants' arguments submitted January 15, 2003, and in response, has withdrawn all previous grounds of rejection. With the present office action, however, the Examiner has conducted a new search, cited a new reference, and introduced a new ground of rejection. Namely, the Examiner has rejected claims 1, 3, 17, and 32 under 35 U.S.C. § 103(a) as being unpatentable over Kompfner, U.S. Patent No. 4,337,993 ("Kompfner") in view of Mey, *et al.*, U.S. Patent No. 5,608,278 ("Mey, *et al.*"). This rejection has been made final.

Making a new ground of rejection final is appropriate only where the new ground of rejection is necessitated by applicant's amendment of the claims or based on information submitted in an information disclosure statement filed during the period set forth in 37 C.F.R. § 1.97(c) with the fee set forth in 37 C.F.R. § 1.17(p). MPEP § 706.07(a). Although Applicants submitted an information disclosure statement pursuant to § 1.97(c), the Examiner refused to consider the information it contained and did not base a rejection thereon. Therefore, the submitted information disclosure statement is not a basis for the finality of the new rejection.

Rather, the Examiner's justification for the final rejection is Applicants' December 16, 2002 amendments. Applicants respectfully submit that the amendments made did not necessitate the new ground of rejection and that, as such, the finality of the rejection is premature.

In the application as filed, claim 1 recited directing a source of input optical signals onto a movable diffractive optical element (MDOE) to generate output signals, each of said input signals being associated with a given wavelength, supplying one or more output stations, and moving said MDOE to distribute said output optical signal(s) among said output stations. Claim 17 is a system claim that as originally filed recited a source of input signals, an MDOE, and output station. Claim 32 recited directing a source of input optical signals onto an MDOE to generate output signals, each of said input signals being associated with a given wavelength, and moving said MDOE to distribute said output optical signals among said output stations.

In their prior response, Applicants amended claims 1, 17, and 32. Each claim was amended to recite "a movable diffractive optical element (MDOE) having a surface carrying a holographic diffraction grating including an array of facets, each of said facets carrying a diffraction grating(s) which are superimposed, each being angularly offset with respect to each other". Thus, the only amendment made to these claims was to recite a specific type of holographic diffraction grating carried by the MDOE. Claim 31 as originally filed, and which was pending when the Examiner conducted the initial search, recited that "said MDOE bears a

Appln. No. 09/836,685
Amendment dated April 30, 2003
Reply to Office Action of February 6, 2003

holographic diffraction grating". The MPEP clearly provides that "the invention as disclosed and claimed should be thoroughly searched in the first action and the references fully applied." MPEP § 706.07. This provides the applicant with a full and fair hearing and enables a clear issue between the applicant and the Examiner to be developed before appeal. *Id.* The Examiner's initial search, including, *inter alia* claim 31, should have encompassed all the prior art relevant to the claims as amended. With Applicants' amendments, each of the three independent claims recite a specific type of holographic diffraction grating, but that limitation should have been encompassed by the broader search related to holographic diffraction gratings generally which would have been necessitated by claim 31. Therefore, these amendments do not necessitate the examiner's new ground of rejection.

The new reference, Mey, *et al.*, has been cited as disclosing a method and apparatus for moving a diffractive optical element, that movement being effected by attaching a diffraction grating to a magnet and energizing a coil magnetically coupled to said magnet. The movement of a diffraction grating is a central aspect of the invention which has been present in all claims at all times. Effecting that movement via a magnet and coil configuration is the feature recited in pending claim 3, which is dependent on claim 1. Applicants' only amendment of claim 3 was to change the article "a" to "said". Because claim 3 depends from claim 1, the diffraction grating being moved is now a holographic diffraction grating. However, because holographic diffraction gratings are a subset of diffraction gratings, the Examiner's search of the broad concept of moving a diffraction grating which would have by definition uncovered apparatus for moving a holographic diffraction grating.

In light of the above, Applicants' submit that the finality of the rejection is premature and request that it be withdrawn.

The New Ground of Rejection:

Looking to the new ground of rejection, Applicants respectfully submit that claims 1, 3, 17, and 32 are not unpatentable under 35 U.S.C. § 103(a) over Kompfner in view of Mey, *et al.*

The Examiner cites Kompfner as disclosing a device that carries a holographic diffraction grating including an array of facets, each of the facets carrying a diffraction grating(s) which are superimposed, each being angularly offset with respect to each other, and positioned to intercept said input optical signals for generating and distributing output optical signals. The Examiner also cites Mey, *et al.*, as disclosing a method and apparatus for moving a diffractive optical element, that movement being effected by attaching a diffraction grating to a magnet and energizing a coil magnetically coupled to said magnet.

Appln. No. 09/836,685
Amendment dated April 30, 2003
Reply to Office Action of February 6, 2003

All of the independent claims recite a movable diffractive optical element (MDOE). The important feature about this component is that it moves. See, for example, claims 1 and 32 which each recite the step of "moving said MDOE to distribute said output optical signal(s) among said output station(s)." It is this movement of the MDOE that accomplishes the diffraction of input signals and direction of output signals to a plurality of output stations. The optical element disclosed in Kompfner is stationary, i.e., the optical system includes two optical devices and one phase grating plate all fixed with respect to one another. Col. 1, lines 39-41. Thus, the light from each input fiber is always directed to a predetermined output fiber, i.e., each input fiber is always coupled with the same output fiber. Kompfner simply is a fiber coupling system.

The present invention is not limited to directing a specific input to a specific output. By utilizing a holographic diffraction grating carried by the MDOE, at a given angle with respect to a light source, a diffraction grating of a particular spacing will be presented. By rotating the MDOE to a different angle with respect to the light source, a different diffraction grating with a different diffraction grating will be presented. So, for each different rotational position of the MDOE an input signal will be diffracted to create an output signal which is directed to a different output station, i.e., signals from a plurality of input fiber may be distributed among a plurality of output fibers. Kompfner neither discloses nor suggests such a method or apparatus.

Mey, *et al.*, does not make up for the deficiencies of Kompfner. Mey, *et al.*, discloses a beam scanning system, such as a printer. In operation, the device includes a light beam source that is directed to a rotating hologon disk which includes a plurality of facets each bearing a diffraction grating. A motor is provided to effect rotation of the hologon disk. The disk is rotated such that the input beam is sequentially incident on the diffraction gratings, imparting a scanning motion to the light beam so as to form a scanning output beam. The output beam will scan in a nominally horizontal direction as the hologon disk is rotated. Additional optical components are provided to deflect the output and generate a 2-dimensional raster scan. The magnets and coils cited by the Examiner simply are components of the motor assembly used to effect rotation of the hologon disk.

Applicants first respectfully submit that the rejection is improper in that there is no motivation to combine Kompfner and Mey, *et al.* As described above, Kompfner is a coupling device, the diffractive element of which generates a one-to-one correspondence between each input fiber and a predetermined output fiber. Mey, *et al.* is a scanning device not a telecommunications device. Thus, there is but a single input, not a plurality of input signals. Absent hindsight reconstruction of the invention, what is the motivation to replace the telecommunications volume phase grating of Kompfner with the scanning rotating diffractive element of Mey, *et al.*? Neither patent recognizes the need to direct any of a plurality of input

Appl. No. 09/836,685
Amendment dated April 30, 2003
Reply to Office Action of February 6, 2003

signals to any of a plurality of output locations. Kompfner's intent is merely to connect a single input fiber with a single output fiber.

Even if there were a motivation to combine the references, the resulting device still would not disclose the claimed invention. Attached is a simplified graphic representation of the Kompfner and Mey, *et al.* references along with a representation of the combination. With respect to Kompfner, the circles labeled A, B, and C represent select input fibers, while the circles labeled 1, 2, and 3 represent select output fibers. Between the input and output fibers is the volume phase grating (11) of Kompfner. As can be seen from this diagram, at any given time, the signal from input fiber A is always directed to output fiber 1. Similarly, the signal from input fiber B is always directed to output fiber 2, and the signal from input fiber C directed to output fiber 3. The number of signals, namely three, was chosen for convenience to illustrate these patents. Such number is not a limitation.

With the Mey, *et al.* diagram, the circle labeled I represents the source beam (16). The rectangular shape to the right represents the rotating hologon disk (26). Because Mey, *et al.* discloses a scanning device, there is no mention in the patent of fiber inputs or outputs. However, Mey, *et al.* does disclose generating a scanning beam that will scan in a horizontal direction. By definition, that scanning beam will have a predetermined output sequence that never changes. See, U.S. Patent No. 3,619,033 issued November 9, 1971 to McMahon. The circles labeled as O₁, O₂, and O₃ represent hypothetical output fibers placed along the horizontal scan path generated by the Mey, *et al.* device. The result is that light from the source I would be sequentially directed to output fibers O₁, O₂, and O₃. Once the disk had completed a full circle, it would repeat the pattern, directing light sequentially again to fibers O₁, O₂, and O₃. Because of the predetermined output sequence of the scanning output beam, the light would always be directed from O₁ to O₂ to O₃ in that order.

The third diagram represents the combination of the fiber input and outputs of Kompfner with the rotating hologon of Mey, *et al.* The input fibers again are labeled A, B, and C, while the output fibers are labeled 1, 2, and 3. Between the input and output fibers is the rotating hologon of Mey, *et al.* As can be seen, when the disk begins to rotate, the signals from the input fibers will be directed to a particular output fiber. For example, the signals from input fibers A, B, and C will be directed to output fibers 1, 2 and 3, respectively. As the disk continues to rotate and each signal encounters a different diffraction grating having a different grating spacing, the signals will be directed to different output fibers. As shown at time 2, the signal from input A now is directed to output fiber 2, and the signals from output fibers B and C are directed to output fibers 3 and 1, respectively. At time 3, the signals from A, B, and C are directed to output fibers 3, 1, and 2, respectively. Looking at the resulting direction of signals, it may be seen that

Appln. No. 09/836,685
Amendment dated April 30, 2003
Reply to Office Action of February 8, 2003

the limitations of the rotating disk, (i.e., creation of a scanning beam) limits the direction of signals to a sequential order. For example, as the hologon rotates, the signal from input fiber A is sequentially directed to output fibers 1, then 2, then 3. The signal from input fiber B will be directed to 2, then 3, then 1. The signal from output fiber C will be directed to the output fibers in the order of 3, the 1, then 2. As the disk continues to rotate, the signals will continuously be directed to the output fibers in their respective preordained orders.

What the present invention can do that the combination of Mey, *et al.*, and Kompfner cannot is direct any signal from any input fiber to any output fiber, and change the designated output fiber at will. A graphic representation of the present invention is not provided as any combination of signals is possible. For example, the combination of Mey, and Kompfner requires that when the signal from input fiber A is directed to output fiber 2, that the signal from input fiber B always be directed to output fiber 3. See Combination, time 2. The present invention is not limited in this manner. When the signal from input A is directed to output fiber 2, the signal from input fiber B could be directed to any of the output fibers, including 1, 2, or 3. Signals also can be combined or separated. The signals from input fibers A and B could both be directed to output fiber 1. The distribution of signals also is independent of time. At each time, T, all of the possibilities are present. The distribution of signals is not constrained based on what happened at a previous time, e.g., T minus 1. For example, at time 1, the signals from input fibers A and B could both be directed to output fiber 1. At time 2, the same distribution could be maintained. Thus, the invention is useful in switching, multiplexing, and demultiplexing applications. See Application, Figs. 1-6.

For the reasons stated above, the Applicants respectfully submit that the invention is not rendered obvious by either Kompfner, Mey, *et al.* Or the combination of Kompfner and Mey, *et al.*

Information Disclosure Statement:

In their December 16, 2002 amendment and response, Applicants submitted a publication entitled "Micromotor grating optical switch" for the Examiner's consideration. Applicants apologize for not using the formal language set forth in 37 C.F.R. 1.97(e). However, it was applicants' intent in saying that the publication had been recently discovered by one of the inventors, Jefferson E. Odhner, to communicate that the requirements of Rule 97 were met. Namely, that no item of information contained in the information disclosure statement was cited in a communication from a foreign office and that a reasonable inquiry had been made and no item of information contained in the information disclosure statement was known to any individual designated in § 1.56(c) more than three months prior to the filing of the information disclosure

Appln. No. 09/836,685
Amendment dated April 30, 2003
Reply to Office Action of February 6, 2003

statement. Applicants hereby confirm that this statement was true as of December 16, 2002 when the publication was submitted.

With respect to the proper fee for consideration of the information disclosure statement, Applicants authorized that any fees required under 1.16 and 1.17 should be charged to the a deposit account. This authorization, along with deposit account information, was provided in the fee transmittal submitted at the filing of the application. In the event that the Examiner believes that an express authorization is needed, Applicants hereby authorize the appropriate fee to be charged to the deposit account. In the event that the finality of the rejection is withdrawn, that fee is \$130.00. If the Examiner does not withdraw the objection, then the Examiner is authorized to charge the fee of \$180.00 as cited in Rule 1.17 for consideration of an information disclosure statement after a final rejection.

In light of the above, Applicants request that the Examiner consider the information disclosure statement.

Extension of Time:

In order to permit the examiner to fully consider Applicants response, Applicants submit herewith a request for a one month extension of time up to and including June 6, 2003 to file a notice of appeal.

In view of the remarks submitted herewith, Applicants request that the finality of the rejection be withdrawn and that the claims be allowed and passed to issue.

Date: April 30, 2003

Respectfully submitted,

Diane E. Burke

Diane E. Burke
Reg. No. 45,725
MUELLER AND SMITH, L.P.A.
MUELLER-SMITH BUILDING
7700 Rivers Edge Drive
Columbus, Ohio 43235-1355
Tel.: 614-436-0600
Fax: 614-436-0057
email: dburke@muellersmith.com

FAX RECEIVED

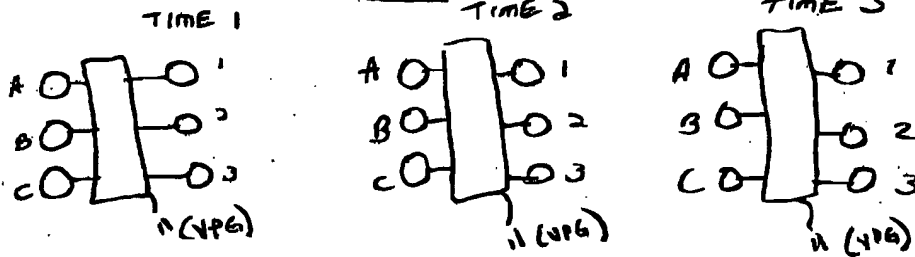
APR 30 2003

TECHNOLOGY CENTER 2800

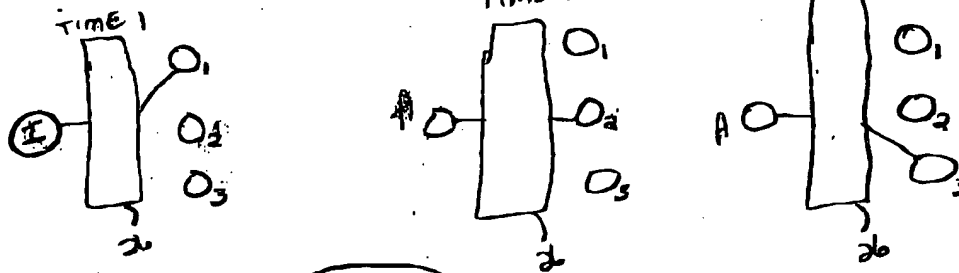
Appln. No. 09/836,685

Amendment dated April 30, 2003

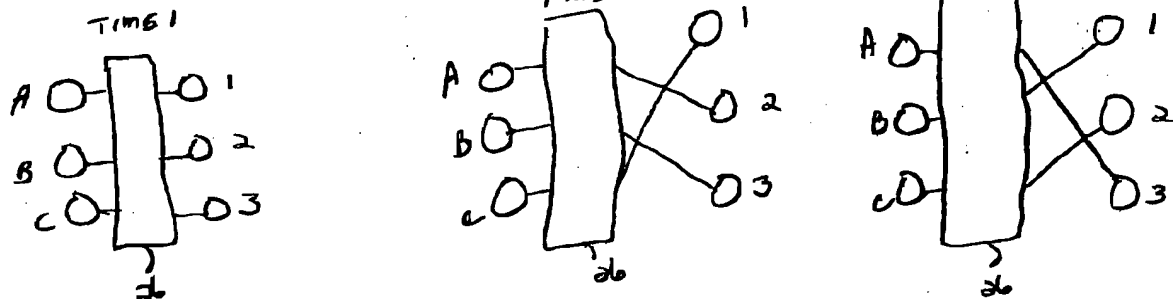
Reply to Office Action of February 6, 2003

KOMPFNER (STATIONARY)

RESULT: A → 1 1 1
 B → 2 2 2
 C → 3 3 3

MEY (ROTATING)

RESULT: A → 1 2 3

COMBINATION (ROTATING)

RESULT: A → 1 2 3
 B → 2 3 1
 C → 3 1 2